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19970018626 Advisory Group for Aerospace Research and Development, Flight Vehicle Integration Panel, Neuilly-Sur-Seine, France

Subsystem Integration for Tactical Missiles (SITM) and Design and Operation of Unmanned Air Vehicles (DOUAV)
L'Integration des Sous-Systemes dans les Missiles Tactiques et la Conception et l'Exploitation des Vehicules sans Pilote

Nov. 1996; 356p; In English; In French, 9-12 Oct. 1995, Ankara, Turkey; Sponsored by Advisory Group for Aerospace Research and Development, France; Also announced as 19970018627 through 19970018652

Report No.(s): AGARD-CP-591; ISBN-92-836-0033-9; Copyright Waived; Avail: CASI; A16, Hardcopy; A03, Microfiche

Papers address examples of integrating advanced sensors, guidance control systems, and navigation systems. Methods for testing missiles, including lessons learned from Norway's testing of the Penguin Mk2, are discussed. Design issues, payloads and their associated technologies, and operational issues are examined in relation to Unmanned Air Vehicles (UAV). Specific systems described included: the French Self Contained Early Warning System against anti-ship missiles; the Phoenix; Boeing's heliwing; the Crecelle; and the US Navy's Tilt Rotor UAV demonstrator.

Author

Systems Integration; Missiles; Helicopters; Flight Tests; Integral Rocket Ramjets; Missile Configurations; Aerodynamic Coefficients; Missile Control; Pilotless Aircraft; Conferences

19970019345 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Stick and Feel System Design *Systemes de restitution des efforts au manche*

Gibson, J. C., Gibson (J. C.), UK; Hess, R. A., California Univ., USA; Mar. 1997; 180p; In English

Report No.(s): AGARD-AG-332; ISBN-92-836-1051-2; Copyright Waived; Avail: CASI; A09, Hardcopy; A02, Microfiche

Since the earliest days of manned flight, designers have sought to assist the pilot in the performance of tasks by using stick and feel systems to bring these tasks within the bounds of human physical capabilities. This volume describes stick and feel systems in two parts. Part one describes the technologies which have been developed throughout the history of 20th Century aviation. Part two describes how modern systems dynamics interact with the human pilot. It is hoped that the design lessons and approaches outlined in this volume will contribute to a better understanding and appreciation of the importance of force-feel system design in aircraft/rotorcraft flight control.

Derived from text

Aircraft Control; Flight Control; Pilot Performance; Control Sticks; Control Theory; Man Machine Systems; Human Factors Engineering; Fly by Wire Control

19970019652 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Bolted/Bonded Joints in Polymeric Composites *Assemblages boulonnées/colles en matériaux composites polymères*

AGARD Conference Proceeding: Bolted/Bonded Joints in Polymeric Composites; Jan. 1997; 272p; In English; 83rd; Structures and Materials Panel, 2-3 Sep. 1996, Florence, Italy; Sponsored by Advisory Group for Aerospace Research and Development, France; Also announced as 19970019653 through 19970019676

Report No.(s): AGARD-CP-590; ISBN-92-836-1046-6; Copyright Waived; Avail: CASI; A12, Hardcopy; A03, Microfiche

The objective of this AGARD Specialists' Meeting on Bolted/Bonded Joints in Polymeric Composites was to examine the state of the art in joining polymeric composites, to consider the relative merits of the various methods and to highlight gaps in the technology which should be addressed. The papers presented cover a number of aspects concerning the application of adhesively bonded and mechanically fastened joints in the analysis, design, manufacturing, and repair of fiber-polymer composites. The focus is on aerospace rather than commercial products.

Author

Adhesive Bonding; Fiber Composites; Bonded Joints; Bolted Joints

19970021152 Advisory Group for Aerospace Research and Development, Propulsion and Energetics Panel, Neuilly-Sur-Seine, France

Propulsion and Energy Issues for the 21st Century *Les Enjeux de la Propulsion et de l'Energetique a l'Aube du 21eme Siecle*

Henderson, Robert E., Editor, Universal Technology Corp., USA; Kuentzmann, Paul, Office National d'Etudes et de Recherches Aérospatiales, France; Besser, Hans-Ludwig, Bayern-Chemie G.m.b.H., Germany; Stull, Frank D., Universal Technology Corp., USA; Waltrup, Paul, Johns Hopkins Univ., USA; Ronald, Terry, Wright Lab., USA; Lazalier, Glendon, Sverdrup Technology, Inc., USA; Hill, Richard J., Wright Lab., USA; Cifone, Anthony J., Naval Air Warfare Center, USA; Meyer, Lee, Phillips Lab., USA; Edelman, Raymond, Boeing North American, Inc., USA; Pesce-Rodriguez, Rose, Army Research Lab., USA; Kolkert, Willem J., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Bennett, Harold E., Bennett Optical Research, Inc., USA; Schadow, Klaus C., Naval Air Warfare Center, USA; Mar. 1997; 68p; In English

Report No.(s): AGARD-R-824; ISBN-92-836-1054-7; Copyright Waived; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report provides a review and capability projection for a number of propulsion technology topics that could ensure and significantly enhance NATO air dominance well into the next century. The main topic deals with a 'Hypersonic Air Breathing Missile' that discusses in an exemplary way the military uses and technology requirements for a new weapon with unprecedented capabilities. This hypersonic missile, traveling at speeds between Mach 6-8, could be used as a medium distance weapon against hardened ground targets, very high value aerial targets, or time critical targets such as mobile theater ballistic missile launchers. Launched from the ground or air, it would cover up to 1500 kilometers in about 15 minutes and be virtually indefensible due to its hypersonic speed. The critical technology is the scramjet engine operating on a liquid hydrocarbon fuel that permits immediate launch and full control of engine power throughout the flight path. Detailed application and technology requirements are described. Maintaining air dominance in the battlefield is predicated on controlling the air space with a variety of air vehicles and missile systems; these are generally powered by gas turbine engines and rocket motors. Gas turbines will continue to be the most cost effective propulsor that can provide the necessary power for maneuverability, armament control and mission flexibility. Rocket engines offer very high specific power that is a fundamental requirement for many types of missiles and boosters. A technology development survey is given that briefly describes the considerable improvements to be expected in performance and economics. Doubling the range and halving the reaction time for fighter and global strike aircraft, and increasing by 50% the reach of global transport aircraft are well within sight. Three examples are given that introduce or foster new types of propulsion. The pulse detonation wave engine offers a marked increase in efficiency and a simplification of design over current rocket and ramjet engines. Gun projectiles may be driven electrically or by liquid charges, both of which promise to overcome the limitations posed by high energy solid propellants. Laser power beaming offers a means of transferring energy to vehicles over large distances. Despite the immense technological complexity, it may open entirely new roads for powering aerial vehicles in the more distant future. First applications may be in repowering satellites for extended operations and shifting of orbits. These technology and application reviews were originally developed under the auspices of the AGARD Aerospace 2020 Study. They are based on input from the AGARD Propulsion and Energetics and other Panels, the Aerospace Applications Study Committee of AGARD, and many contributions from outside AGARD. This report is but one example of the value that AGARD has provided to the military community, often at very short notice, over the past 45 years of its history.

Derived from text

Propulsion; Air Breathing Engines; Ballistic Missiles; Hypersonic Speed; Time Dependence; Technology Utilization

19970021641 Advisory Group for Aerospace Research and Development, Fluid Dynamics Panel, Neuilly-Sur-Seine, France
Turbulence in Compressible Flows *La Turbulence dans les Ecoulements Compressibles*

Turbulence in Compressible Flows; Jun. 1997; 308p; In English, 2-6 Jun. 1997, Rhode-Saint-Genese, Newport News, VA, Belgium, USA; Sponsored by NASA Langley Research Center, USA; Also announced as 19970021642 through 19970021647
Report No.(s): AGARD-R-819; ISBN-92-836-1057-1; Copyright Waived; Avail: CASI; A14, Hardcopy; A03, Microfiche

Lecture notes for the AGARD Fluid Dynamics Panel (FDP) Special Course on 'Turbulence in Compressible Flows' have been assembled in this report. The following topics were covered: Compressible Turbulent Boundary Layers, Compressible Turbulent Free Shear Layers, Turbulent Combustion, DNS/LES and RANS Simulations of Compressible Turbulent Flows, and Case Studies of Applications of Turbulence Models in Aerospace.

Author

Compressible Flow; Computational Fluid Dynamics; Turbulent Flow; Turbulent Boundary Layer; Turbulent Combustion; Lectures; Laminar Flow; Transition Flow; Turbulence

19970023078 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France
Environmentally Compliant Surface Treatments of Materials for Aerospace Applications *les Techniques de Traitement de Surface Conformes a la Reglementation sur la Protection de l'Environnement pour les Matériaux Destines aux Applications Aérospatiales*

Environmentally Compliant Surface Treatments of Materials for Aerospace Applications; Feb. 1997; 180p; In English; In French; 83rd; Structures and Materials Panel, 4-5 1996, Florence, Italy; Sponsored by Advisory Group for Aerospace Research and Development, France; Also announced as 19970023079 through 19970023095

Report No.(s): AGARD-R-816; ISBN-92-836-0040-1; Copyright Waived; Avail: CASI; A09, Hardcopy; A02, Microfiche

In recent years, a great deal of important materials and process R&D has resulted in new or modified aerospace materials that are more environmentally benign. These new materials are implemented on a limited basis, however, wide spectrum materials substitutions are rare because many of the new materials have characteristics that may not fully meet traditional performance standards. Also, as is the case with the phosphoric sulfuric acid anodize process as a substitute for the chromic acid anodize, some processes are less controllable or robust and therefore may suffer when production scale-up of laboratory developed technology is attempted. While low volatile organic compounds (VOC), water-reduced and non-chromate inhibited organic coating technology is developed and being optimized, inorganic finishing and electroplating technology is still immature and many different technologies are under evaluation. Widely implementable materials and process substitutes for electroplated cadmium and chromium are not currently available and therefore require continued investment in research and development.

Derived from text

Metal Surfaces; Environment Protection; Surface Finishing; Cleaning; Protective Coatings; Aerospace Industry; Primers (Coatings); Research

19970025162 Advisory Group for Aerospace Research and Development, Fluid Dynamics Panel Working Group 16, Neuilly-Sur-Seine, France

Cooperative Programme on Dynamic Wind Tunnel Experiments for Manoeuvring Aircraft *Programme en Cooperation sur l'Experimentation Dynamique en Soufflerie pour la Manoeuvrabilite de l'Avion*

Oct. 1996; 248p; In English; Original contains color illustrations

Report No.(s): AGARD-AR-305; ISBN-92-836-1043-1; Copyright Waived; Avail: CASI; A11, Hardcopy; A03, Microfiche

This report describes a multinational cooperative program in response to the continuing interest among the NATO countries in dynamic wind tunnel testing. The program consisted of a series of dynamic experiments on models of a schematic combat aircraft configuration and of two generic aircraft forebodies. Ten wind tunnels in seven countries were involved. The dynamic tests included oscillatory, and in one case oscillatory-coning experiments. In several facilities, this was complemented by static and, in some cases, also dynamic flow visualization experiments in water tunnels. The forebody experiments included extensive surface pressure measurements under rotary conditions, carried out in a pressurized wind tunnel. The reliability of current test techniques was examined; and an expanded data base for dynamic data at high angles of attack is presented.

Author (revised)

Wind Tunnel Tests; Dynamic Tests; Angle of Attack; Fighter Aircraft; Flow Visualization; Pressure Measurement; Reynolds Number

19970025403 Advisory Group for Aerospace Research and Development, Flight Vehicle Integration Panel, Neuilly-Sur-Seine, France

Advances in Rotorcraft Technology *Les Avancees en Technologies pour Aeronefs a Voilure Tournante*

Advances in Rotorcraft Technology; Apr. 1997; 392p; In English; In French, 27-30 May 1996, Ottawa, Canada; Also announced as 19970025404 through 19970025434

Report No.(s): AGARD-CP-592; ISBN-92-836-0038-X; Copyright Waived; Avail: CASI; A17, Hardcopy; A04, Microfiche

The last half of the twentieth century has seen the rotorcraft come in to prominence as a combat system. Rotorcraft have proven their worth in all environments and in all domains of conflict. They will continue to provide essential military capabilities for the Alliance well into the next century. The objective of this symposium was to capture the current situation in the rapidly changing field of rotorcraft technology. The symposium met its objective. Different parts of this Conference Proceedings should be valuable to anyone currently designing or developing rotorcraft, or doing basic research in rotorcraft technology. Special emphasis in the programme was placed upon the following subjects: (1) the impact of the increasing use of commercial off-the-shelf technology in military helicopter development and use; (2) the increasing acceptance and expanded use of Aeronautical Design Standard ADS-33; and (3) the issue of rotorcraft flight safety. This symposium provided an excellent forum for a varied program of technical presentations. It specifically provided information on the Bell 230, the Tiger, Eurocopter EC 135, the V-22, and the RAH Comanche. The knowledge gained and exchanged at this symposium should assist the attendees in helping to provide NATO with the future affordable combat rotorcraft it will need to maintain our current technological lead.

Author

Conferences; Flight Safety; Helicopter Design; Standardization; Helicopter Performance; Rotary Wing Aircraft

19970025584 Advisory Group for Aerospace Research and Development, Fluid dynamics Panel Working Group 19, Neuilly-Sur-Seine, France

Sonic Nozzles for Mass Flow Measurement and Reference Nozzles for Thrust Verification

Jun. 1997; 86p; In English

Report No.(s): AGARD-AR-321; ISBN 92-836-1056-3; Copyright Waived; Avail: CASI; A05, Hardcopy; A01, Microfiche

This report presents the results of a multinational effort to reflect the state-of-the-art for the accurate measurement of mass-flow and thrust. The accurate measurements of these quantities is essential to the success of windtunnel tests supporting engine-airframe aerodynamic integration studies. It is concluded that the measurement of gaseous mass flows with +/-0.1% or better is still very difficult. For most test cases, however, with reasonable care, bias and random errors can be kept within +/-0.1% respectively. For thrust measurements, these values must typically be doubled. This report presents the results of work conducted by Working Group 19 of the AGARD Fluid Dynamics Panel.

Author

Aerodynamic Characteristics; Mass Flow; Flow Measurement; Thrust Measurement; Sonic Nozzles; Fluid Dynamics; Gas Analysis

19970026047 Advisory Group for Aerospace Research and Development, Aerospace Medical Panel, Neuilly-Sur-Seine, France

Medical Screening of Subjects for Acceleration and Positive Pressure Breathing *La Surveillance Medicale des Sujets Relative aux Accelerations et a la Surpression Ventilatoire*

Jul. 1997; 48p; In English

Report No.(s): AGARD-AR-352; ISBN-92-836-0045-2; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The AGARD Aerospace Medical Panel sponsored a Workshop on the Medical Surveillance of Subjects for Acceleration Research. There remain unanswered questions about the possible long-term medical complications of repetitive exposure to G forces. The outcome of the Workshop includes a consensus protocol for medical screening of subjects for acceleration research, and a protocol for a database to track medical occurrences of NATO centrifuges.

Author

Aerospace Medicine; Pressure Breathing; Stress (Physiology); Acceleration Tolerance; Acceleration Stresses (Physiology); Physiological Effects

19970026150 Advisory Group for Aerospace Research and Development, Flight Vehicle Integration Panel, Neuilly-Sur-Seine, France

Helicopter/Weapon System Integration *L'integration des systemes d'armes des helicopteres*

Jul. 1997; 184p; In English, 19-20 May 1997, Winchester, Athens, UK, Greece; Also announced as 19970026151 through 19970026159

Report No.(s): AGARD-LS-209; ISBN-92-836-1055-5; Copyright Waived; Avail: CASI; A09, Hardcopy; A02, Microfiche

This publication includes the papers presented in a NATO Advisory Group for Aerospace Research and Development (AGARD) Lecture Series. This Lecture Series considered the problems of integrating externally mounted weapons on helicopters. The focus is on aeromechanical and structural aspects, with additional discussion on operational issues. It addresses new aspects in the field of helicopter/weapon system integration; it places a strong emphasis on the lessons learned from recent experiences in actual development programs. The publication includes case histories of weapons integration on the AH-64 Apache, the RAH-66 Comanche, the EH-101, and the Tiger.

Author

Helicopters; Systems Integration; Weapon Systems

19970026365 Advisory Group for Aerospace Research and Development, Fluid Dynamics Panel, Neuilly-Sur-Seine, France
Capsule Aerothermodynamics *L'Aerothermodynamique des Capsules*

Capsule Aerothermodynamics; May 1995; 296p; In English, 20-22 Mar. 1995, Rhode-Saint-Genese, Belgium; Also announced as 19970026366 through 19970026379

Report No.(s): AGARD-R-808; ISBN-92-836-1053-9; Copyright Waived; Avail: CASI; A13, Hardcopy; A03, Microfiche

Lecture notes for the AGARD Fluid Dynamics Panel (FDP) Special Course on 'Capsule Aerothermodynamics' have been assembled in this report. Aerodynamic design aspects related to planetary probe and capsule configurations are covered, as well as critical phenomena occurring during the different regimes of flight. The impact of real gas and refraction on capsule aerothermodynamics, and in particular on forebody and wake flow, is addressed. The material assembled in this report was prepared under the combined sponsorship of the AGARD Fluid Dynamics Panel, the Consultant and Exchange Program of AGARD, and the von Karman Institute (VKI) for Fluid Dynamics.

Author

Aerothermodynamics; Heat Transfer; Space Probes; Hypersonic Flow; Space Capsules; Aerodynamics; Lectures; Rarefied Gas Dynamics; Rarefaction

19970026380 Advisory Group for Aerospace Research and Development, Aerospace Medical Panel, Neuilly-Sur-Seine, France
Audio Effectiveness in Aviation *L'Efficacite des Communications Vocales en Aeronautique*

Audio Effectiveness in Aviation; Jun. 1997; 370p; In English; In French, 7-10 Oct. 1996, Copenhagen, Denmark; Also announced as 19970026381 through 19970026417

Report No.(s): AGARD-CP-596; ISBN-92-836-0043-6; Copyright Waived; Avail: CASI; A16, Hardcopy; A03, Microfiche

These proceedings include the Technical Evaluation Report, a Keynote Address, three overview addresses of key technical areas, 34 solicited papers, and a Summary paper of the Symposium sponsored by the AGARD Aerospace Medical Panel held in Copenhagen, DE, from 7-11 October 1996. Topics addressed during this Symposium were: Audio Displays Noise Control, Passive Technique Noise Control, Active Technique Noise Control, Applications Communication in Stressful Environment, and Voice Control.

Author

Aerospace Medicine; Conferences; Noise Reduction; Voice Communication; Human Factors Engineering; Aircraft Noise; Cockpits; Voice Control; Auditory Perception

19970026418 Advisory Group for Aerospace Research and Development, Mission Systems Panel, Neuilly-Sur-Seine, France
Space Systems as Contributors to the NATO Defence Mission *Les Systemes Spatiaux Contribuant a la Strategie de Defense de l'OTAN*

Space Systems as Contributors to the NATO Defence Mission; Jun. 1997; 194p; In English; In French; 5th, 3-6 Jun. 1996, Cannes, France; Also announced as 19970026419 through 19970026435; Original contains color illustrations

Report No.(s): AGARD-CP-580; ISBN-92-836-0041-X; Copyright Waived; Avail: CASI; A09, Hardcopy; A03, Microfiche

This volume contains the Technical Evaluation Report and the 19 unclassified papers, presented at the Mission Systems Panel Symposium. The papers presented cover the following headings: Invited Papers; Military Applications of Civil Systems; Communications (Systems); Communications (Technology); Surveillance (Reconnaissance); Surveillance (Meteorology); Surveillance (Early Warning); Information Extraction; Vehicle Management; Future Systems and Panel Discussion.

Author (revised)

Aerospace Systems; Military Technology; Reconnaissance; Surveillance; Telecommunication

19970026623 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

AGARD Highlights 97/1, April 1997

Apr. 1997; 60p; In English

Report No.(s): AGARD-Highlights-97/1; Copyright Waived; Avail: CASI; A04, Hardcopy; A01, Microfiche

On the occasion of its 45th anniversary, the North Atlantic Treaty Organization's (NATO's) Advisory Group for Aerospace Research and Development (AGARD) joined forces with the Defence Research Group to form a new Research and Technology (R&T) Organization. This issue of 'Highlights' discusses the 'new' R&T organization, the recipients of the von Karman medals for 1996 and 1997, and includes presentations on the German aerospace industry, exploiting opportunities in dual-use R&T, NATO's maritime operations in 2015, and an article on the importance of and technologies for combat identification.

CASI

International Cooperation; International Relations; Organizations; Aerospace Technology Transfer; Research and Development; Information Flow; Military Technology

19970026663 Advisory Group for Aerospace Research and Development, Sensor and Propagation Panel, Neuilly-Sur-Seine, France

Radar Signature Analysis and Imaging of Military Targets *L'Analyse de la Signature Radar et de la Videoscopie de Cibles Militaires*

Apr. 1997; 196p; In English; In French, 7-10 Oct. 1996, Ankara, Turkey; Also announced as 19970026664 through 19970026682 Report No.(s): AGARD-CP-583; ISBN-92-836-0039-8; Copyright Waived; Avail: CASI; A09, Hardcopy; A03, Microfiche

Radar has been around for more than half a century now. During this time it has reached both widespread application and a high degree of sophistication. Still, it is far from being a mature science. Major improvements in concept, componentry and information exaction continue to make radar more capable in detecting and identifying targets. Parallel with this development, the concealment of military targets is an ever-increasing necessity and is progressing with similar strides. A review of recent developments in the analysis of radar signatures of military targets is therefore timely and appropriate. The symposium addressed many aspects of this multi-faceted topic. Numerical target modeling holds great attraction. Methods are presented to render the problem computationally more efficient. Simulation and scaled measurements in comparison with full-size target measurements serve to build confidence in using a cost-effective combination of these techniques to determine radar cross section data. Environmental factors such as rain depolarization and surface multi-path propagation were considered, along with man-made chaff as they impact on radar. An important subject for study was the robustness of non-cooperative target identification based on target doppler characteristics, polarimetry and one- or two-dimensional imaging. The availability of large amounts of data from modern radar systems makes the automation of target detection almost mandatory. The benefits of different approaches are compared. Signature modification is a prerequisite for target survival in the sophisticated electronic warfare arena of the future. Papers ranged from low radar cross section structural designs and retrofits to active cancellation techniques.

Author

Radar Imagery; Radar Tracking; Target Acquisition; Electronic Warfare; Cost Effectiveness; Radar Cross Sections; Radar Signatures; Signature Analysis; Radar Targets; Imaging Techniques